

Page 1 *Hallmarks*

A young person may not know he or she has suffered a concussion. However, you can recognize a probable concussion by knowing the symptoms and signs. Suspect concussion when symptoms include **even one** physical, emotional, cognitive, or sleep-related symptom. Watch for signs and think concussion if, after an impact, a young person is confused, possibly disoriented, possibly unsteady.

A concussion can happen WITHOUT loss of consciousness, WITHOUT a blow to the head.

Symptoms, Signs, & Myths

Video

ARTHUR MAERLENDER, PhD, ABPP, Center for Brain, Biology, & Behavior Associate Director: So when a young person does get hit or falls and has this biomechanical force that shakes the brain in their skull, there's a response to that.

LILY SUGHROUE, Living with Concussion After Effects:

The kinds of things that I was experiencing after just having one brain injury were things with difficulty concentrating, difficulty focusing on the school work that I was working on.

ARTHUR MAERLENDER: Symptoms are what they report when we ask them if they have nausea or aren't feeling good to their stomach, if they have a headache.

LILY SUGHROUE: I had nauseousness [sic], dizziness.

ARTHUR MAERLENDER: The signs being how we observe them to behave, whether they stumble and fall, or have trouble walking, or even a loss of consciousness. We used to think that loss of consciousness was required, but we don't anymore.

LILY SUGHROUE: I had several orthopedic surgeries after my first concussion because I was so unbalanced and I kept getting injured. My mood had completely changed from one being happy and bubbly Lily to irritable, angry, moods up and down. I couldn't regulate myself.

ARTHUR MAERLENDER: And even one symptom can indicate that there is a concussion. More and more we're trying to be cautious. So that we are thinking that if you have one symptom, we probably want to remove you from play and then monitor that.

Page 2 *Clinical Domains*

The 5th International Consensus (Berlin 2016) states that a suspected diagnosis of SRC can include one or more of the following clinical domains:

a. Symptoms:

- somatic (e.g., headache),
- cognitive (eg, feeling like in a fog),
- sleep, and/or
- emotional symptoms (e.g., lability)

b. Physical signs (e.g., loss of consciousness, amnesia, neurological deficit)

c. Balance impairment (e.g., gait unsteadiness)

d. Behavioral changes (e.g., irritability)

e. Cognitive changes (e.g., slowed reaction times, difficulty learning)

f. Sleep/wake disturbance (e.g., somnolence, drowsiness)

Clinical Domains

Symptom Clusters

A young person probably won't tell you, "I've had a concussion!" But the symptoms he or she reports just might. When a youth has suffered a concussion, he or she can experience clusters of symptoms from **any or all** of the categories identified in the Berlin statement. Your patient may report symptoms from any of these symptom clusters:

- Somatic / Physical (such as headache).
- Cognitive (such as feeling in a fog).
- Emotional (such as being irritable over nothing, unusually unemotional or non-reactive).
- Sleep-related (such as being unable to sleep).

Physical Signs

Physical signs of a concussion may or may not be present. Whether a youth mentions them or not, you or others may observe signs such as:

- Loss of consciousness (LOC).
- Balance issues.

Behavior Changes

Even in a young person you have not met before, you may observe behavioral signs of concussion, such as extreme irritability. Questioning the youth and the family or coaching staff will help confirm a change in temperament with a sudden onset, which may signal a concussion.

- Speech tone or pattern changes
- Doesn't seem "like self"
- Atypical reactions

Cognitive Impairment

It's important to watch for cognitive signs of a concussion, especially since the young person may be unaware he or she is having trouble. For example, as you spend time with the young person, you may notice slowed reaction time or difficulty concentrating. These problems may signal cognitive impairment resulting from a concussion.

- Post traumatic amnesia: anterograde, retrograde.
- Unusually distractible or forgetful.
- Does not recognize familiar people.

Sleep Disturbance

Sleep-related signs of a concussion, such as drowsiness, may be observable. Any disruption of the normal sleep pattern can indicate a concussion has occurred.

- Sleeps more
- Increased latency
- Frequent wakings
- Fatigue

If the youth mentions – or if you observe – the presence of **even one** component from any of these clinical domains, suspect concussion and institute an appropriate management strategy. It's important to keep in mind that your vocabulary may be different than the young person's.

Page 3 *Symptom Clusters*

A young person who has suffered a concussion may tell you about one symptom or may describe a variety of symptoms. After an impact, even one symptom is enough to raise suspicions of concussion. The symptoms may come from any or all of the symptom clusters shown here. Combinations of symptoms will vary based on the individual as well as the injury.

After a trauma, suspect concussion if your patient tells you he or she is having . . .

Somatic Symptoms

- Headache.
- Fatigue.
- Dizziness. □ Sensitivity to light.
- Sensitivity to noise.
- Nausea.
- Balance difficulties.

Emotional Symptoms

- Unusual irritability.
- Sadness.
- Feeling more emotional than usual
- Nervousness.
- .

Cognitive Symptoms

- Difficulty remembering.
- Difficulty concentrating.
- Feeling slowed down.
- Feeling “in a fog”.

Sleep Symptoms

- Drowsiness.
- Sleeping more than usual.
- Sleeping less than usual.
- Difficulty falling asleep.

Page 4 *Symptom Subtleties*

The subtleties of symptoms are not always easily identifiable, but are at the core of proper concussion management.

Duration, type, and number of symptoms are *all* important to proper assessment and diagnosis of concussion. However, some symptoms may be more important than others. For instance, nausea and severe headache could indicate something worse than a concussion, such as bleeding in the brain. The length of time of recovery from a concussion may be concerning because it will keep the student out of both play and learning activities.

Also, many athletes may have three to five symptoms *before* getting a concussion. Teenagers sometimes have headaches and trouble focusing for reasons other than a hit on the head. It's crucial *not* to count these pre-injury symptoms in your diagnosis. You must tease out which symptoms are part of the injury and which are not.

There is consensus in the field that athletes with post-concussion symptoms should not Return to Play until they are a-symptomatic, have passed balance and cognition assessments, have been cleared by a licensed health care professional, and have completed a gradual and supervised Return to Play progression.

Page 5 *Emergency Signs*

Refer your patient to the Emergency Department ***immediately*** if you observe ***any*** of these warning signs:

- Loss of Consciousness for longer than 30 seconds.
- Severe and Increasing Headache.
- Focal Neurologic Finding.*
- Increasing Confusion or Disorientation.
- Loss of Range of Motion.
- Bulging Pupils.
- Seizures.
- Repeated Vomiting.
- Slurred Speech.
- Significant Cervical Pain.**

***focal neurologic finding**

A deficit or problem with nerve, spinal cord, or brain function that indicates a specific location in the brain, such as an issue with the left side of the face, numbness, tingling, bulging pupils, loss of function of a limb.

****cervical pain**

Pain in the neck area in relation to the spine. Most episodes will get better with time, but if accompanied by neurological deficits or lack of appetite over time could indicate a more serious issue.

Page 6 *LOC, Amnesia, & More*

Symptoms and Recovery

Sudden onset of any concussion symptom is a red flag for possible concussion.

- The number and severity of symptoms as well as previous concussions are associated with prolonged recovery.
- Brief LOC and/or impact seizures do not reliably predict the length of recovery.
- ***A child generally takes longer to recover from a concussion than an adult does.***

Loss of Consciousness (LOC)

A change in mental status at the time of an injury signals concussion, **even if there is no loss of consciousness (LOC).**

- Concussion can occur without LOC.
- It's estimated that less than 10% of concussions involve LOC.
- LOC at the time of concussion must be viewed as a sign of a potentially worrisome traumatic brain injury, especially if it lasts longer than 30 minutes.
- LOC followed by more severe acute neural status abnormalities carries a greater risk of intracranial pathology.

Amnesia

A change in mental status at the time of an injury signals concussion, **even if there is no amnesia.**

- It's estimated that less than 25% of concussions involve post-traumatic amnesia.
- **Concussion patients with amnesia experience more persistent symptoms than those with brief LOC.**
- Amnesia can be retrograde or anterograde.

Retrograde amnesia is the loss of memory of events that took place immediately **preceding** an injury.

- Typically it affects **short term** memory centers.
- It's noticeable in responses to questions about such topics as date, time, location, score, recent meals, or play responsibilities.

Anterograde amnesia involves a deficit in forming **new** memory. Post-traumatic amnesia is a type of anterograde amnesia that happens as a result of an injury. This can be evident in failure to recall details **after** the event in response to questioning, such as about the final score, dressing, leaving, going home, and so on.

Page 7 *See the Signs*

Lily's Mom Saw the Signs

Video

LILY SUGHROUE, Living with Concussion After Effects:

The things that people noticed about me that were different, especially from my mom who was my number one caregiver at the time was things like I was not sleeping. I went probably three or four days without sleeping and you know, that's obviously a huge red flag. |

Another thing is I would tell my mom that I hated to read. Which, you know, I never hated to read before. I started having really bad attendance and shying away from friends and family. I dealt with a lot with depression and irritability. And so all of those things were not normal for me, and that's when my mom thought there's something wrong, and we need to figure out what it is. |

And the only reason that I think I was able to get that help that I needed was because my mom started working at Madonna Rehabilitation Hospital in Lincoln, Nebraska. I'm so glad that she was able to talk to a neuropsychologist, because they brought me in, they evaluated me, and finally figured out what was wrong.

Mention of any specific health care facility or organization in the videos reflects an individual's specific experience and is not intended as an endorsement from this site.

You can collaborate with the responsible adults in a young person's life to share observations and alert each other when a young person shows signs of a concussion. By working together, licensed health care professionals, family, and academic and coaching staff can help recognize concussions early, which will enable you to manage treatment effectively and ensure the youth gets the care, time, and rest essential for recovery.

Concussion Signs Anyone May Observe

- Vacant stare.
- Slow to answer questions or follow instructions.
- Easily distracted.
- Disoriented – can't focus attention or is unaware of time, date, and place.
- Slurred or incoherent speech.
- Photophobia.*
- Memory deficits – repeatedly asks the same questions, can't remember events prior to injury, can't remember events after injury.
- Gross incoordination – can't walk a straight line.
- Emotions out of proportion to the situation.
- Loss of consciousness.
- Seizures.
- Nystagmus.**

Concussion Signs Family or Friends May Observe

- Reduced play.
- Reduced activity.
- Difficulty completing chores.
- Depression.
- Sleep disruption.
- Loss of interest in preferred activities.
- Unusual irritability toward:
 - Parents.
 - Siblings.
 - Boyfriends/girlfriends.

Concussion Signs School or Program Staff May Observe

- Difficulties with concentrating.
- Difficulties with focus.
- Difficulties remembering assignments.
- Difficulties tolerating the environment.
- Fatigue. □ Drop in grades.
- Drop in attendance.

***photophobia** = Extreme sensitivity to light.

****nystagmus** = Involuntary eye movements.

Many tools are available to aid in recognition, management, and monitoring of concussions, each appropriate to a particular stage in your concussion care plan.

Point of Injury: Symptom Recognition in the Initial Evaluation

Having the means to recognize concussion symptoms and signs can help clinicians properly diagnose any insult to the brain caused by the impact. Proper diagnosis is the first step to proper concussion management. There must be a mechanism of injury, together with rapid onset (within 24 hours) of 'typical signs and symptoms

The best practice is to assess *balance, cognition, symptoms, oculo-motor signs*;
Use *standardized tools* in the correct administration (within 48 hours);
Rule-out alternative diagnoses;
Diagnosing after 48 hours is difficult;

It is also important to gather information of the patient and injury from all available sources, particularly important if you didn't witness the injury.

(See Berlin 2016 for statement about Sideline Evaluation).

Pocket Concussion Recognition Tool

The pocket concussion evaluation was developed with the latest Consensus Statement on Concussion in Sport from 2013. It's one example of a tool that can be used on the spot, at the point of injury, to help determine whether to suspect a concussion based upon symptoms, signs, and questions related to memory.

<http://dhhs.ne.gov/ConcussionManage/Documents/PocketConcussionRecognitionTool.pdf>

Concussion Management: Planning Recovery and Return

The proper management of the injury includes, in part, tracking the resolution of symptoms following a concussion. While the resolution of symptoms should not be the sole basis for determining the return-toactivity status of a concussed patient, it should be utilized as part of a more comprehensive clinical decision-making process. To manage concussion care, you will need a plan for return to activity or Return to Play.

Acute Concussion Evaluation (ACE) Care Plan

The ACE is a part of the Centers for Disease Control and Prevention's ***Heads Up: Brain Injury in Your Practice*** tool kit. The ACE Care Plan provides an example of the guidelines that can be used to help manage the progression of return to activity for individuals who have suffered a concussion. The ***Heads Up: Brain Injury in Your Practice*** tool kit also includes the ACE evaluation form, which can be used during the clinical evaluation to help determine whether or not an individual has sustained a concussion.

<http://dhhs.ne.gov/ConcussionManage/Documents/ACE.pdf>

Moving Toward Recovery: Tracking Symptom Resolution

Another method of monitoring the symptoms during the recovery described in the ACE Care Plan is to use a graded symptom checklist that allows for multiple days to be tracked. Bear in mind that return to activity should not be based solely on the self-reported resolution of symptoms. Symptom scales provide a valuable method for monitoring the progression of concussion symptoms over several days.

Graded Symptom Scale Checklist

The graded symptom checklist is one example of how you can track and monitor concussion symptoms during the recovery process described in the ACE Care Plan. The checklist allows for several days to be tracked on a seven point Likert-type scale.

TEXT

Module 3 *Symptoms &*

Concussion Recognition & Management

Signs

<http://dhhs.ne.gov/ConcussionManage/Documents/GradedSymptomScaleChecklist.pdf>